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ABSTRACT

In today's mathematics classroom there is much concern about the students' lack of success. Mathematics teachers can successfully incorporate reading into their classrooms by: (1) promoting in-class reading activities; (2) teaching vocabulary; (3) emphasizing mathematical symbols; and (4) ensuring understanding of mathematical sentences. Reading and mathematics are inextricably intertwined. Taught together they can advance the student to higher levels of success. (Author/RS)

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Reading and Mathematics: The Twain Shall Meet

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Running Head: READING AND MATHEMATICS

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Abstract

In today's mathematics classroom there is much concern about the lack of success on the part of students. Mathematics teachers can successfully incorporate reading by: (a) promoting in-class reading activities, (b) teaching vocabulary, (c) emphasizing mathematical symbols, and (d) ensuring understanding of mathematical sentences.

Reading and Mathematics: The Twain Shall Meet

In today's mathematics classroom there is much concern about the lack of success on the part of students. Mathematics teachers can successfully incorporate reading by: (a) promoting in-class reading activities, (b) teaching vocabulary, (c) emphasizing mathematical symbols, and (d) ensuring understanding of mathematical sentences.

Promoting In-class Reading Activities

Introducing in-class reading activities can be used to achieve a higher level of success in mathematics. Since reading and mathematics are two of the three basic skills taught in school, the mathematics teacher should consider using reading activities to enhance his/her instruction. In fact, the interweaving of these skills would seem to be obligatory. Krulik (1980) notes the high correlation between problem solving in mathematics and comprehension in reading. Krulik further maintains

that before students can solve a mathematical problem, they must first be able to read and understand it.

There are advantageous ways that the mathematics teacher can use reading in teaching mathematics. The teacher should give the students a reading assignment in the text. Sutdents should then read the information and restate it orally or in writing. Henrichs and Sisson (1980) state, "Reading is a process necessary to all subjects at all levels and it must be integrated with course content." They cite the successes of the West Junior High School (Columbia, MO) Title IV-C project, "Reading Instruction in the Content Areas." The component parts of this program include (a) reading mathematics textbooks, (b) developing vocabulary, (c) improving comprehension skills, (d) sharpening listening skills, (e) upgrading the rate of reading, (f) reading for recreation, (g) viewing study skill/content-area videotapes, (h) working on directed reading lessons, and (i) learning basic skills. Krulik maintains that students' reading mathematics assignments in a slow, step-by-step procedure promotes better understanding. In addition, Denmark (1983) and

Krulik suggest using cloze exercises in which students read and fill in the missing blanks of a brief paragraph in a mathematics textbook or a paragraph which explains the meaning of a word problem. Denmark recommends listing words on the chalkboard in scrambled order and letting students refer to this list as they complete the assigned cloze exercise.

The following paragraph can be rewritten to illustrate the format of a cloze exercise:

> Geometry, as its name implies, is simply the measurement of the earth. The word came from two Greek words, "ge" meaning "the earth" and "metrein" meaning "to measure." This "measurement of the earth" began as an art and not as a science.

Rewrite this paragraph as:

> Geometry, as its name implies, is simply the _____ of the earth. The word came from two words, "ge" meaning "the earth" and "metrein" meaning _____. This "measurement of the earth" began as an _____ and not as a science.

Another example of an in-class reading activity is to have students read and restate word problems. Students often think that reading a word problem once is sufficient to its understanding. Students should read and restate problems either orally or in writing. They should dissect every word of the problem and differentiate between more important and less important information.

Henney (1971) states that, while computational skill is necessary to verbal problem solving, it is useless without the student's ability to read the problem accurately. Moreover, Henney maintains that, because reading verbal problems requires more concentration than reading narrative materials, students should reread verbal problems. Denmark notes

the following difficulties associated with word problems: (a) students often know the meaning of the problem, how to solve it, but fail to give the correct answer due to overlooking a specific detail and (b) students do not understand the problem because they fail to consider an implicit assumption necessary to the comprehension of the problem. Krulik recommends selecting problems from the students' textbooks and asking the students to rewrite the problems in their own words so long as the information and data in the problem remain the same.

An example of this last suggestion is as follows:

> The Pizza Emporium sells 4 kinds of salads, 10 kinds of pizza, and 3 kinds of desserts. How many different 3-course meals can be ordered?

This problem can be rewritten as:

> Sue has 4 skirts, 10 blouses, and 3 belts. How many different 3-piece outfits can she make?

Teaching Vocabulary

Teachers should emphasize the importance of the vocabulary of mathematics - not only word definitions but also the context in which the words are used. Teachers should give vocabulary tests which tap understanding and application. Incorporating mathematics vocabulary instruction helps students eliminate confusion often associated with such words as: brace, radical, identity, prime, arc, substitute, volume, mean, power. Krulik recommends that students play games they are familiar with on television (like Concentration) to increase their familiarity with mathematical terms.

Henrichs and Sisson (1980) cite the West Junior High School Title IV-C project as including activities at all levels of the mathematics curriculum to teach students technical vocabulary. Such activities include: knowledge of common prefixes, suffixes, and root words; and efficient use of a glossary. Feeman (1973) acknowledges that the root structure of a mathematical term is sometimes helpful in determing its

meaning (words like triangle, quadrilateral, and polygon). Feeman, however, notes another class of mathematical terms whose root structures do not obviously convey word meaning (words like factor, quotient, and vertical angle). Pachtman and Riley (1978) list nine steps for teaching mathematics vocabulary related to specific word problems: (a) select problems to teach which reflect the concepts you wish students to learn, (b) list the vocabulary in the word problems that students need to know, (c) add to this list relevant mathematical concepts not included in the vocabulary terms (properties, commutative, etc.), (d) arrange the words in categories or relationships (i.e. odd, consecutive, and even under the category Integer), (e) place words on cards, (f) break students into small groups and give each group a set of cards, (g) supervise and assist the groups, (h) complete the activity and give feedback, and (i) reinforce learned concepts.

Krulik recommends that students keep a dictionary of mathematics words that have different meanings in contemporary usage - words like volume, count, brace,

odd, prime, difference, mean, and power. The following sentences provide examples of this situation:

1. Write each number as a product of its prime factors.
2. The Cosby Show comes on in prime time.
3. Johnny got his braces today.
4. Place braces around that expression.
5. Mrs. Smith is a mean teacher.
6. What is the arithmetic mean of 88, 76, and 99?

Emphasizing Mathematical Symbols

Teachers should emphasize the understanding of mathematical symbols. Students must know how to read and understand symbols mixed within textual narrative. Have students identify and explain orally or in writing the use of symbols as they occur in their mathematical readings.

Schell (1982) relates that students can be more successful in understanding symbols if they learn to associate a word or phrase with symbols. Schell states that students should be able to express an idea in

objects, pictures, words, and symbols. Schell also recommends using graphic materials like tables, graphs, or charts when teaching students how to read mathematical symbols. Feeman notes several exercises teachers can use to aid students in understanding symbols (i.e. having students draw a circle around the symbol which stands for a certain expression).

Ensuring Understanding of Mathematical Sentences

Teachers should ensure student understanding of mathematical sentences by having students read and explain them. For example, let the student explain orally or in writing why "1 + 2 = 3" is the same as "3 = 1 + 2." In addition one can have problems about the direction in which the problem has to be read. "1 + 2 = 3" can also be written

$$\begin{array}{r} 1 \\ +2 \\ \hline 3 \end{array}$$

Schell states that students must learn to read and understand mathematical sentences early in their mathematical development. This includes their being able to recognize, pronounce, and understand words and

symbols in the context of the sentence. Schell also notes that, because no single technique works with all students, teachers must concentrate their efforts on various strategies which they find effective.

Reading is not a discipline confined to itself. Students do not learn reading in one class and mathematics in another. In fact, reading and mathematics are inextricably intertwined. Taught together they can advance the student to higher levels of success.

REFERENCES

Barney, L. (1972). Problems associated with the reading of arithmetic. Arithmetic Teacher, 19, 131-133.

Denmark, T. (1983). Sharing teaching ideas: Improving students' comprehension of word problems. Mathematics Teacher, 76, 31-36.

Earp, N. W. (1970). Procedures for teaching reading in mathematics. Arithmetic Teacher, 17, 575-579.

Feeman, G. F. (1973). Reading and mathematics. Arithmetic Teacher, 20, 523-529.

Henney, M. (1971). Improving mathematics verbal problem-solving ability through reading instruction. Arithmetic Teacher, 18, 223-229.

Henrichs, M., & Sisson, T. (1980). Mathematics and the reading process: A practical application of theory. Mathematics Teacher, 76, 253-277.

Krulik, S. (1980). To read or not to read, that is the question! Mathematics Teacher, 73, 248-252.

Lees, F. (1976). Mathematics and reading. Journal of Reading, 19, 621-626.

Maffei, A. C. (1973). Reading analysis in mathematics. Journal of Reading, 16, 546-549.

Pachtman, A. B., & Riley, J. D. (1978). Teaching the vocabulary of mathematics through interaction, exposure, and structure. Journal of Reading, 22, 240-244.

Phillips, J. (1968). Reading mathematical content. The Instructor, 77, 120, 136, 138.

Schell, V. J. (1982). Learning partners: Reading and mathematics. The Reading Teacher, 35, 544-548.

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